

Temposonics®

Magnetostrictive Linear-Position Sensors

MTS
SENSORS

C-Series Core Sensor
Stroke length 72 - 250 mm (2.83 - 9.84 in.)
Analog and PWM Outputs

551020 H

Product Specification



- **Non-contact** - No wear, such as found with pot wipers on conductive mylar, particularly when mounted on dithered actuators or vibrating installations
- **Light Weight** - Ideal for small portable OEM products
- **Low Cost** - Total Cost Competitive* with linear pots or LVDT's
- **Short, Operating Space** - Half the space needed compared to LVDTs or rod and cylinder pots
- **Small Size** - This smallest package in the market that has all the benefits of magnetostrictive sensing and fits where no other sensor can
- **Easy Interfacing** - Choice of analog or self-interrogating PWM signals
- **Low Power Needs** - Allows use with printed circuit-level supplies of +5 Vdc
- **No Drift** - No periodic re-calibration needed
- **Optional Supply Voltages** - Allows use in +12 Vdc systems
- **Optional Housings** - Allows exposed use by offering mounting options and several levels of environmental protection
- **Optional Magnets** - Other magnet configurations allow greater range of installation choices
- **Customizable Active Zones** - Offers full output sensitivity for smaller active zones
- **Customizable Reading Direction** - Forward or reverse acting analog output allows match to control requirements

Applications

OEM products needing embedded, or externally mounted continuous position or liquid-level information.

Markets

Medical treatment equipment and mobility devices, a wide range of tools, entertainment automaton, marine steering and trim, HVAC, food preparation equipment, exercise equipment, off-road equipment, and any high-volume market needing low cost, small, embeddable position sensing.



The MTS waveguide element is sheathed by a flexible blue plastic pipe. Due to this construction, the core sensor permits a curve or arc shaped sensing range for realizing the measurement of non-linear displacements without further modification or expensive adaptation. When faced with a difficult geometric shape of a OEM part, installation around a radius edge is easy.



All specifications are subject to change. Please contact MTS for specifications that are critical to your needs. For more information go to www.mtssensors.com.

* Initial cost + installed cost+ warranty costs + cost of lost goodwill.

C-Series product line

The C-Series modular sensor line was created to support industrial, medical and consumer product OEMs who recognize the benefits of magnetostrictive position sensing technology but didn't have a product solution that could be tailored to their high-volume but low-cost driven sensing needs. This line is a more reliable, no wear measurement system compared to traditional alternatives such as pots and Linear Variable Differential Transformers (LVDT's). No other magnetostrictive sensor manufacturer can offer such a small, embeddable or externally mountable, yet highly malleable sensor at high volume pricing that is attractive for high volume OEM products.

The C-Series Core Sensor (IP 40) is the common sensor for all C-Series models. C-Series additional protective housings and accessories can be added to this Core Sensor.

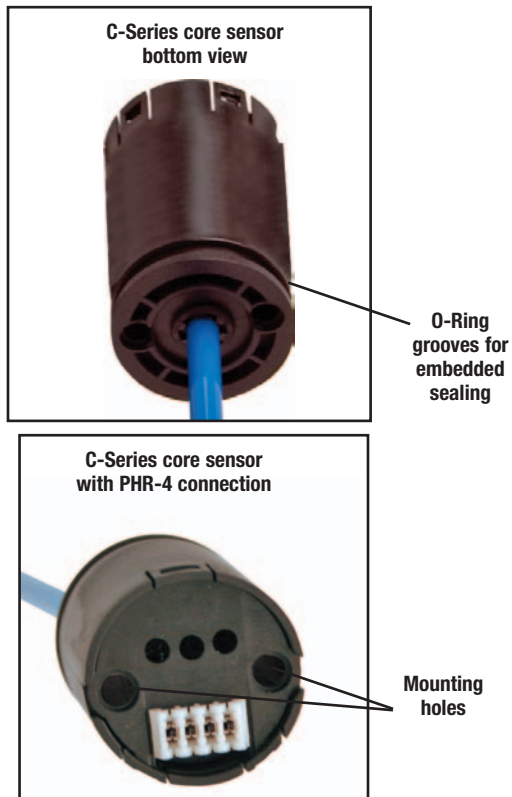
The core sensor

The Core Sensor is a complete, functional sensor in every respect making it ideal for embedded sensor applications where the OEM product provides all the environmental protection necessary for the application and any additional sensor protective housing would be redundant, representing unnecessary cost in extremely cost sensitive moderate to high volume OEM products.

There are two models, the CS and CM. The CS is designed for general purpose applications and requires 5 volt power supply. The CM is designed specifically for mobile equipment applications by including additional protection from over voltage and reverse connection and allows the use of a 12 volt supply.

Connection is made using a four-pin, JST PHR-4 model mating connector for use with 24 AWG wire in MTS provided cables or discrete wire pigtails. The connection is also compatible with the JST KRD 04-KR-06 insulation displacement 26 AWG connector.

Other views



The two mounting holes have sealed paths. The sealed paths contain a breakaway plastic layer that can be gently tapped with a mounting screw and screwdriver end (or similar tool) if mounting holes are used.

Specification

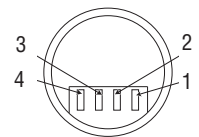
Parameter	Specification
Outputs:	Analog (forward acting): - Model CS 0.1 to 4.9 Vdc @ +5 Vdc supply, ratiometric with V supply. - Model CM 0.1 to 4.9 Vdc, fixed output @ +12 Vdc supply, ratiometric @ 5 Vdc supply (Contact MTS about customized reverse acting or redefined active zones.) PWM: Active high @ >60% Vs, inactive low at <30% Vs PWM high period = Waveguide sonic velocity (2702 meters (8863 feet) to 2890 meters (9479 feet)/sec; median 2794 meters (9164 feet) /sec or 0.3579 $\mu\text{sec}/\text{mm}$) x (stroke position + null position)† stroke position is measured at magnet face closest to the sensor head. Update frequency: 2.6 KHz (385 microseconds period).
Stroke lengths available:	72.3 mm (2.846 in.), 109.3 mm (4.311 in.), 128.3 mm (5.051 in.), 148.0 mm (5.827 in.), 162.3 mm (6.390 in.), 186.3 mm (7.335 in.), 194.3 mm (7.650 in.), 217.3 mm (8.555 in.), and 250.1 mm (9.846 in.).
Non-linearity:	± 0.15 mm (0.006 in.) without correction, using a 401842 magnet measured between 5% and 95% of active stroke.
Repeatability:	± 25 microns
Hysteresis:	± 25 microns
Operating temperature:	-40 °C (-40 °F) to +105 °C (221 °F)
Voltage input:	CS: 5 Vdc -5%, +10%; CM: 5 Vdc -5%, +10% or 12 Vdc $\pm 25\%$
Current drain:	40 mA
Mounting:	2 M3 x 37 screws
Temperature drift:	Voltage ± 20 micron/°C, PWM ± 10 micron/°C
Output load:	Analog: $\leq 6k \leq R \leq 10k\Omega$ PWM: $\leq 400k\Omega$
Standard magnet:	Part no.401842 (float and other magnets optional)
Package rating:	Core IP 40, IP 67 with housing
Zero tolerance:	± 1.0 mm (0.039 in.)
RF emissions and immunity:	Contact MTS
Mating connector:	JST PHR-4 socket female (24 AWG) crimp pin JST 04KR-D6S (26 AWG) insulation displacement

† Null position time for PWM calculations varies based upon waveguide velocity for each sensor, any part tolerance variances and the type of magnet used. A rough calculation uses the median velocity of 2794 meters per second (0.3579 $\mu\text{sec}/\text{mm}$) and the magnet, part no. 401842. Null = 0.3579 $\mu\text{sec}/\text{mm}$ x (40.8 mm [distance from the internal mode converter to spec null point] + 10 mm [distance from the magnet (part no. 401842) face to where the return signal originates]) = 21.7 μsec . Each sensor and magnet combination should be measured at specified physical null for the PWM equivalent

Wiring pin designation

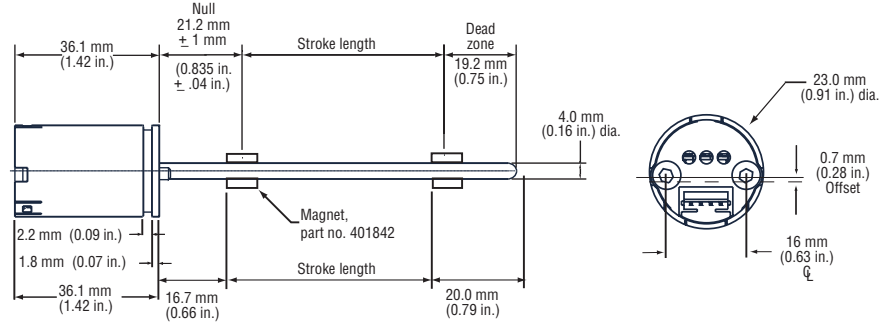
Pin number	Color convention (optional wire/cable)	Signal
1	White	Common
2	Green	Voltage output
3	Brown	Supply voltage (+)
4	Green	PWM output

CS and CM connector Pin designations 24 AWG

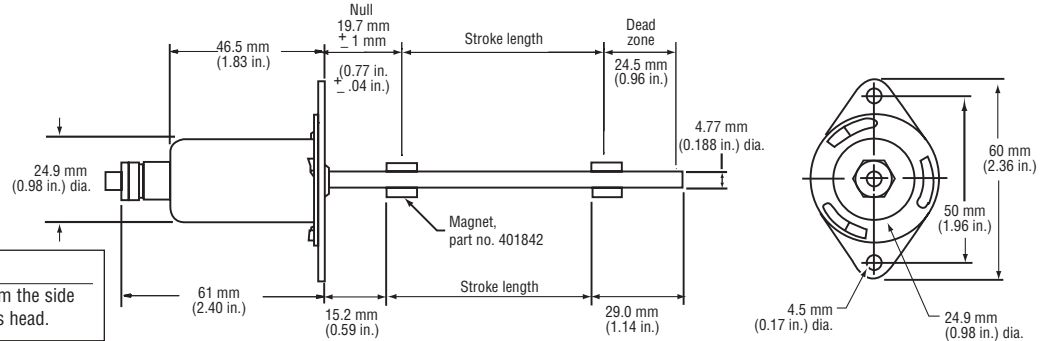


Dimensions

C-Series core sensor



C-Series core sensor with IP 67 housing option



Note:

Stroke lengths are calculated from the side of the magnet facing the sensor's head.

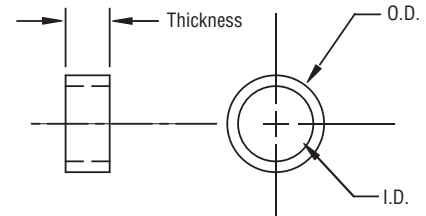
Magnets and floats

Ring magnets

Description	Part no.	O.D.	I.D.	Thickness
6 mm (0.24 in.) standard ring magnet	401842	9 mm (0.354 in.)	6.5 mm (0.256 in.)	9 mm (0.354 in.)
19.3 mm (0.76 in.) optional ring magnet	400424	28.0 mm (1.102 in.)	19.3 mm (0.760 in.)	4.9 mm (0.193 in.)

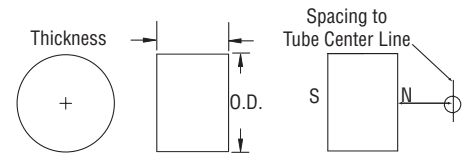
Note:

See technical note, part number 551056 for magnet installation recommendations in metallic structures.



Specialty magnet

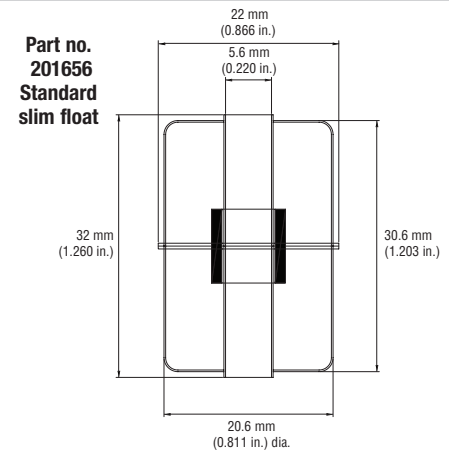
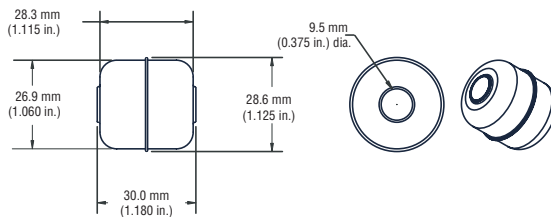
Description	Part no.	O.D.	Spacing to Sensor C/L	Thickness
Button magnet	253619	9.9 mm (0.354 in.)	8 mm (0.315 in.) ± 2 mm (0.079 in.)	6.35 mm (0.25 in.)



Float kits

Description	Part no.	O.D.	I.D.	Depth
Standard wide float	201611	28.6 mm (1.126 in.)	9.5 mm (0.374 in.)	30 mm (1.181 in.)
Standard slim float	201656	22 mm (0.866 in.)	5.6 mm (0.220 in.)	30.6 mm (1.203 in.)

Part no. 201611 Standard wide float



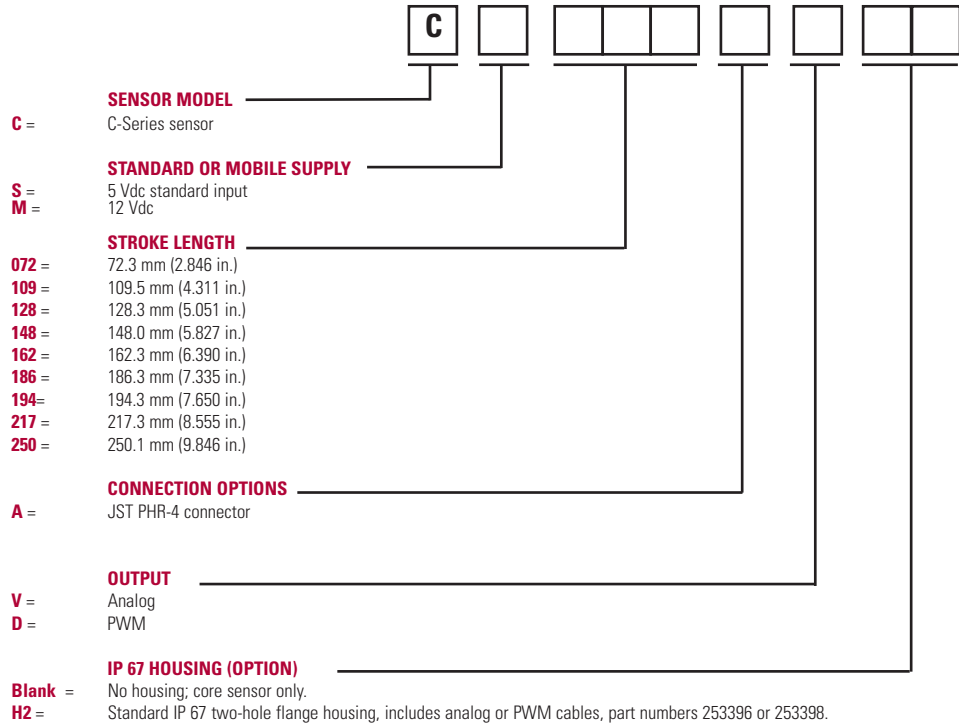
How to order

How to order - required

1. Order part no. for sensor with or without IP 67 housing.
2. Order appropriate magnet or float (one per sensor).

How to order - options

3. Order mating connector or cable assemblies as needed.
4. IP 67 housing component kits are available at www.mtssensorsstore.com for those wanting to purchase housings as separate line items.



Magnet and float options (one required per sensor)

Description	Function/notes	Part no.
6 mm (0.236 in.) ring magnet	Standard	401842
19.3 mm (0.760 in.) optional ring magnet	For applications requiring a magnet with more clearance	400424
Button magnet	For applications that cannot use a ring or bar magnet <i>(note operating clearance limits).</i>	253619
Float, standard slim	Standard float with magnet	201656
Float, standard wide	Standard float with magnet	201611

Mating connector and cable assembly options

Description	Function/notes	Part no.
JST KRD connector only	Insulation displacement mating connector only	370500
JST PHR-4 connector & cable (Analog)	Mating connector with 1 m cable	253396
JST PHR-4 connector & cable (PWM)	Mating connector with 1 m cable	253398

Accessory kits

Description	Function/notes	Part no.
Screw kit	Used only with core sensor (not needed with H2)	561106
Gaskets	Used with H2: CPDM	402809-1
	PTFE	402809-2

Part Number: 05-07 551020 Revision H

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All Temposonics sensors are covered by US patent number 5,545,984. Additional patents are pending.

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